



### Backing policy with science

ENDURE, a Network of Excellence bringing together universities, research institutes, farmer organisations, biological control companies and other stakeholders in Europe, has been selected by the European Commission to become a reference point for the development and implementation of durable pest control strategies. Since it started last year, ENDURE has pooled its international expertise to examine major specific crop protection problems occurring in European agriculture and is committed to offer scientific support to policy makers in the implementation phase of the EU Thematic Strategy on the Sustainable Use of Pesticides, and especially to provide references, tools and knowledge for IPM, which is expected to become compulsory by 2014.

## Innovative technologies for IPM implementation

### To implement IPM at a European level, farmers need innovative technologies to accompany new crop protection strategies

The ENDURE Network of Excellence has been conducting research on innovative technologies for more than 18 months, across a wide range of disciplines.

Amongst its key projects, ENDURE intends to provide end-users with solutions through the development of a modeling platform and integrating decision support systems (DSS), by looking for applicable molecular and serological techniques for detection of plant pathogens and examining existing technologies and research prototypes for precision spray application. Progress on this work was revealed at ENDURE's recent international conference, and details of these projects can be found online ([www.endure-network.eu](http://www.endure-network.eu)).

With regards to DSS, for example, a pan-European workshop brought together 49 leading experts to review the availability, attributes and implementation of computer programs to guide optimal crop protection strategies and was the starting point of a

group working on this topic. One objective of this survey is to look to reduce the dependency on and use of pesticides by identifying the 'best parts' of DSS. The first results have now been produced (story below).

Similarly, precision agriculture requires state-of-the-art farm machinery, and technology to link operators with the hardware. ENDURE has been working on developing 'task controller' software as an interface between operators and hardware. ENDURE's group studying precision agriculture has also initiated a discussion forum on open source software to design this tractor-mounted task controller and for use in precision agriculture. They will also be proposing suitable standards for geo-referenced data for the task controller.

A system whereby diseases, pests and weeds can be identified at a much earlier stage than is now the case would make it possible to limit the amount of chemicals applied. Earlier identification could also allow growers



New farm machinery will be needed. Copyright: Jean Weber, INRA, France

to use biological controls or other measures.

ENDURE's team examining innovative technologies is focusing on the optimal combination and integration of diagnostic tools and precision spraying techniques to reduce pesticide use. A review describing applicable techniques for detection of plant pathogens in air, soil, starting material and in the field has been produced, plus another other describing existing technologies and research prototypes for precision spraying. A review describing how diagnostic tools can facilitate the use of precision spraying techniques has now been written. An innovative crop protection system is currently being designed.

## European decision support systems for weed control

Part of ENDURE's work on decision support systems (DSS) has been an examination of DSS for weed control in Europe, incorporating nine systems from seven countries. All these DSS were targeted at farmers but differed in their decisions supported, in the number of crops covered and in their impact.

A workshop held earlier this year in Denmark identified a set of 'best parts' from these DSS which could be unified at a European level. These could form the bases for building and validating DSS on a European level that meet the need for robustness in production lines and which hold some potential for reducing the dependency on

and use of herbicides.

When some robust and potent DSS concepts have been identified, the production and exchange of data that supports integrated decision algorithms and calculation models of such DSS should be coordinated at a European level, says the research team involved in the project.



## Economic forces under spotlight

One ENDURE research team is analysing economic driving forces to identify and improve the implementation of crop protection strategies that are less reliant on pesticide use yet remain economically viable.



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They are using a three-phase approach, first classifying wheat and apple production systems within the EU according to intensity and innovation of pesticide use. This will be followed by the identification of the socio-economic factors influencing the intensity and innovation of pesticide use at a farm level and under defined policy scenarios. In addition, the profitability of crop protection strategies will be calculated. Finally, policy recommendations will be made to encourage those factors that make possible economically viable crop production systems that are less dependent on the use of pesticides.

## Exploiting ENDURE assets: system-based approach

Several activities in ENDURE have considered the same crops (such as wheat and pomefruit) from different points of view (such as diseases, pests, weeds, precision agriculture, damage modeling, economy and sociology) and while the outputs remain, for the moment, separate they offer the potential for a unique multidimensional approach.

This multidimensional and multidisciplinary approach is currently gaining ground in ENDURE and taking the shape of a system-based approach. Instead of studying a specific pest on a specific crop, the system approach is enlarging the frame of experimentation: going from field to landscape study and from annual crop to rotation. This holistic approach is fully relevant when one considers the

factors affecting the success or failure of IPM introduction.

ENDURE has particular strengths for implementing this system-based approach, such as a great linkage between its activities, making them a useful support for integration and increasing the output value by exploiting complementarities and synergies. This approach also anchors research activities in concrete situations, providing them with a central research subject and making them more output-oriented. Finally, this approach better exploits the large diversity of scientific disciplines within ENDURE.

Two System Case Studies (SCS) have been launched in 2008, one on arable crops and one addressing a perennial crop (orchards). A third distinct and important

type of system will be addressed in 2009: greenhouses and, more generally, agriculture in protected environments.

Over the past six months, the arable crop SCS has elaborated a detailed project including a meta-analysis of the effects of rotations, a socio-economic diagnostic and a redesign of crop protection in winter crop-based and maize-based cropping systems.

The Orchard SCS was conducted on a narrower basis and is now intended to be *the* case study for perennial cropping systems in ENDURE. It includes socio-economic analysis, landscape elements and interactions and scenario modeling to identify innovative technologies for integrated control strategies.

## Interview: case studies, results and the future

**ENDURE believes case studies offer the prospect of significant short-term progress on optimising and reducing pesticide use. We caught up with Per Kudsk, leader of the case study groups**

**ENDURE:** What was the rationale behind the case studies and what has been achieved?

**PK:** It has brought together researchers who have not previously worked together. The overall goals were to compile information on best practices in different countries, to assess the extent it is possible to extrapolate experiences from one region of Europe to another and to point out needs for future research. A

lot of valuable information was collected and been made available to a broader audience in the form of guides for advisers.

**ENDURE:** What happens to the studies now finishing?

**PK:** Hopefully the networks that now exist will continue to collaborate, either within or outside ENDURE. The participants of the wheat, integrated weed management and pomefruit studies are involved in the system case studies started this year. Furthermore the participants of the wheat case study are developing a EUROWHEAT platform inspired by EUROBLIGHT. Hopefully the participants of the tomato case study could also find a way to continue their collaboration within the

new system case study on Mediterranean protected agriculture.

**ENDURE:** What are the new case studies?

**PK:** The new ongoing case studies are on maize, field vegetables and banana and next year we will start a case study on grapevine. Maize and grapevine are major crops and the reliance on pesticides is very high. Field vegetables are faced with a decreasing number of pesticides available for farmers which means prompt action is needed. Banana was chosen because it is imported in large quantities and is also grown in the EU. The main focus is to ensure information on protection strategies is made available to INCO countries.